TO: The Engineering Faculty
FROM: Department of Biomedical Engineering
RE: Permanent Dual Level Course Number

The Department of Biomedical Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

BME 583 Biomaterials

A. Course Description

Sem. 2. Class 3, cr. 3. (Offered in alternate years.)

Prerequisites:
Permission of the instructor required

Course description:
Course discusses principles of biomaterial design, synthesis, and evaluation for various tissues/organs of the body including orthopaedic/dental, cardiovascular, kidney, liver, lung, skin, nerve, and brain. Topics include fundamentals of materials science and engineering integrated into biology for the better regeneration of tissue.

Reason:
The third time this course was taught was in the Fall of 2003. No courses currently exist at Purdue that specifically addresses Biomaterials Science and Engineering.

George R. Wodicka
Professor and Head

Supporting Documentation:

Course Instructor: Tom Webster
Offered: fall semester (even years)

Course Objective:
To integrate materials science and engineering concepts with biology to educate students how to design successful biomaterials.

3. SYLLABUS:

Topics	No. of Lectures
Introduction to course	1
Structure of solids	3
Atomic bonding, crystal structure, imperfections	
Characterization of materials	4
Mechanical properties, stress-strain behavior	
Viscoelasticity, thermal properties, phase diagrams	
Strengthening mechanisms, surface properties	
Metallic implant materials	3
Ceramic implant materials	3
Polymeric implant materials	4
Composites as biomaterials	2
Structure-property relationships in biology	3
Proteins, polysaccharides, mineralized tissue: bone/dentin	
Organ Transplants	3
Tissue response to biomaterials	7
Normal wound healing process, body response to implants	
Cell response to biomaterials	8
Protein mediated cell adhesion	
Student Presentations	3
Total	44

4. SUGGESTED REFERENCE AND/OR TEXTBOOKS:

1. Park JB and Lakes RS: Biomaterials an Introduction. Plenum Press, New York, 1992.
2. Ratner BD, Hoffman AS, Schoen FJ, Lemons JE: Biomaterials Science: An Introduction to Materials in Medicine. Academic Press, New York, 1996.
3. Hudson JB: Surface Science. Butterworth-Heinemann, Boston, 1992.

4. Simon SR: Orthopaedic Basic Science. American Academy of Orthopaedic Surgeons, Rosemont, IL, 1994.
5. Fung YC: Biomechanics: Mechanical Properties of Living Tissues. Springer-Verlag, New York, 1993.
6. Guyton AC and Hall JE: Textbook of Medical Physiology. W.B. Saunders Company, Philadelphia, 1996.

5. DOCUMENTATION ON PREVIOUS COURSE OFFERINGS:

	Fall 1999	Fall 2001	Fall 2003
Total Number of Students Enrolled	10	14	17
Total BME Students Enrolled	4	13	12
Course Evaluation	4.1/5.0	4.5/5.0	4.8/5.0